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Job match and income distributions

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Abstract

This paper studies the income distributions from the view of job match. By numerical simulation, we present different income distributions cases with different degrees of job match. In particular, we analyze the probability distribution of individual income, and we also discuss the economic efficiency and economic equality in different job match cases. Our basic results are that different job matchs can change income distributions, and good job matchs can not only improve economic efficiency but also aggravate economic inequality.

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Keywords: Job match; Income distributions

Economists have studied wealth and income distributions for a long time [1–3]. In 1897 Pareto [4] proposed that wealth and income distributions obey universal power laws. Subsequent studies have often disputed this conjecture. Mandelbrot [5] proposed that the Pareto law applies only asymptotically to the high ends of the distributions. As for the lower income range, Gibrat [6] proposed that it takes a lognormal distribution, Granshaw [7] proposed that it takes a Gamma distribution, Dragulescu and Yakovenko [8,9] proposed that it takes an exponential distribution.

On the other hand, many researchers tried to deduce the Pareto law and other distribution forms through different mechanisms. Gibrat [6] proposed that income and wealth are governed by multiplicative random processes, which result in a lognormal distribution. Modern econophysicists [10,11] also use various versions of multiplicative random processes in theoretical modeling of wealth and income distributions. Dragulescu and

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Yakovenko [12,13] conjectured that income may be governed by a statistical mechanics process and income stationary distribution results in an exponential distribution.

Our work also aims to explore a new mechanism of income distributions. An important fact is that: in most countries, the most important reason for income inequality is differences in wages, with differences in property income accounting for only a small portion of incomes inequality [14]. So as to study the income distributions, we focus on wage income, which come from job. Obviously, different individuals get different wages. However which elements contribute to the wage difference? According to standard economics, we can conclude the elements as two factors. One is individual characteristics or quality, such as human capital, which reflects the individual's health and intelligence, skill and knowledge. The other is the individual job characteristic, which supplies the opportunity to obtain a different wage. Basically, taking the same job position, the individual with higher quality gets more income, and owning the same quality, the individual taking a better position gets more income. The deep reason for the wage difference is the individual's work output, which is decided by combination of the individual's characteristics and job position. Naturally, a question will arise: how are the individual characteristics and the job position combined? One extreme case is that the combination is random. Another extreme example is that the combination is fully matched, where a high quality person takes a good position, and a low quality person has to take a bad position. Certainly, in the real economy, the combination case should behave between the above two extremes, and in a mature market economy, we propose that the individual characteristics and the job position be nearly fully matched. Based on this idea, we will discuss how the job match affects income distributions.

1. The model

We hold that accumulation of the individual quality is just like accumulation of capital, which is governed by a multiplicative normal process. So we assume the measurement of the ith$(i=1,\ldots,n)$ person's quality is X_i and n person's quality constitute a sample set $\{X_i\}$, which follows a lognormal distribution, that is to say,$\{ln X_i\} \sim N(\mu_x,\sigma_x)$. Similarly, we also hold that the increment of the job position level is analogous to the capital net investment, which is governed by a multiplicative normal process too. So we assume the measurement of the jth$(j=1,\ldots,n)$ job position's characteristic is Y_j, and n position's sample set $\{Y_i\}$ follows a lognormal distribution, that is to say, $\{ln Y_j\} \sim N(\mu_y,\sigma_y)$. Then $Z_i = X_i^{\alpha} Y_j^{\beta}$ is defined as the output of the ith person, where $0<\alpha,\beta<1$. This expression is inspired by the multiplicative production function in economics. Finally, we assume that the ith person gets $S_i = \gamma X_i^{\alpha} Y_j^{\beta}$ from his output as his work income, where $0<\gamma<1$.

Obviously, a person's income results from the combination of the individual quality and his job position. Given a person's individual quality, if he can take a better job position, he will get more income. In a different system of resource allocation, there may be a different combination pattern. For example, in the "plan-command economy", one person may be assigned to a job position arbitrarily, so the combination may be near to random, while in the market economy, one person can choose his job